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THE FORMER EXTENT OF LAKE CORANGAMITE

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Abstract

The present area of L. Corangamite is 100 square miles. Lacustrine deposits above the lake indicate that it formerly covered an area of 700 square miles. The origin and mode of occurrence of the lake deposits and the drainage pattern changes in the area are discussed.

Introduction

L. Corangamite, the largest lake in the State of Victoria, is situated 100 miles W. from Melbourne.

Lake terraces exist, from the W. of L. Corangamite to the E. of the Barwon R., at approximately reduced level 396. The terraces occur at least 10 ft above the bed levels of the various lakes in the area. The absence of continuous land barriers of similar age to the terraces, above R.L. 396, indicates that a lake surface extended over an area of approximately 700 square miles.

Skeats and James (1937) recorded pre-basaltic and post-basaltic lake sediments at the S. extremity of L. Corangamite, the post-basaltic at approximately R.L. 395, 15 ft above the lake level. Grayson and Mahoney (1910), and later Gill (1953), recorded lake terraces 10 ft above the L. Colongulac water level, 8 miles to the W. of L. Corangamite.

In order to supply the water for this lake at R.L. 396, the Barwon R. and Leigh R. would have had to be diverted into the area, and according to calculations by J. Sutcliffe, Hydrologist, State Rivers and Water Supply Commission, based on present run-off and evaporation, the annual rainfall over the catchment would have had to be 13 in. above the present average. The diversion of the Barwon R. was to the NW. at Birregurra. Hall and Pritchard (1903) earlier suggested that the Barwon R. and the Leigh R. flowed to the S. of the Moorabool Hills, before being defeated in the L. Modewarre area. After defeat the valleys were flooded and the lake formed.

Eventually the river valleys were drained when the rising lake level overtopped the former Leigh R.-Moorabool R. divide, downstream from Inverleigh. Capture of the Barwon by the Leigh R. eliminated the lake's major water supply.

As barriers emerged, during the valley drainage phase, a basin of internal drainage formed to the W. of the valley area. Evaporation in the basin area lowered the lake level below the general terrace level, thus leaving chains of lakes. The prevailing winds initiated the formation of lunettes on the emerging lake terraces and land barriers, between the lake chains.

Drainage Pattern Changes

Pre-Basaltic Drainage

During the late pre-basaltic period the S. slopes of the highlands near Ballarat were drained by the southerly flowing Woady Yallock R., the Warrambine Ck, and the Leigh R. (Fig. 1). The drainage systems eroded valley sections in the Palaeozoic sediments in the N., and the Tertiary marine sediments in the S. Bowler (1963) suggested that Moorabool Viaduct sands were distributed over a wide area during the Pliocene epoch. The sands were deposited on the eroded surface.

The Woady Yallock R. flowed S. to Cressy, then SW. to Foxhow, as indicated by cemented river gravels beneath a Newer Basalt flow at Foxhow. The Warrambine Ck eroded a valley parallel to its present course. The Leigh R. followed a southerly course from Inverleigh to Winchelsea (Hall and Pritchard 1903) and joined the Barwon R. in the L. Modewarre Gap. A buried river valley exposed on the Warrambine Ck, 5 miles W. from Inverleigh, indicates that the Leigh R. by-passed the present Inverleigh Gap.

The Barwon R. drained the S. slopes of the Otway Ra. The river followed a northerly course to Winchelsea and turned eastward to the sea. The Barwon R. may have passed through the Wurdi Boluc Gap, R.L. 430, before diversion through the L. Modewarre Gap at an elevation below R.L. 390. The Wurdi Boluc Gap course would be diverted by either the early lava flows of the Newer Basalt or by movements along the Moorabool Hills Monocline.

Newer Basalt

The pre-basaltic land surface, between Camperdown, Colac, Birregurra, and Winchelsea in the S., and Foxhow, Cressy, and Inverleigh to the N., was an area of low relief. The area will be referred to as the lake area.

Lava flows from the numerous active volcanoes in the lake area destroyed the drainage pattern and partially covered the land surface. The valleys of the Woady Yallock R., the Warrambine Ck, and the Leigh R. were infilled. The Leigh R. eroded its present valley to Inverleigh and continued S. to join the Barwon R. in the L. Modewarre area.

Late lava flows blocked the Barwon R. in the L. Modewarre Gap and diverted the waters from the Barwon R. and the Leigh R. into the lake area at Birregurra.

Post-Basaltic Drainage

The waters from the obstructed N. and S. streams were shed into the lake area. A lake, with a water level at approximately R.L. 396, was subsequently formed. The drowned area acted as a sump, receiving water-borne sediments from a 2,500 square mile catchment. Lacustrine sediments were derived from pre-basaltic and basaltic sources. Sands and gravels were supplied by the Palaeozoic sediments and the widespread Moorabool Viaduct sands in the N. Sand was also derived from the Miocene sediments around the periphery of the lake area. Clays and loams were eroded from the volcanics in the area, and from the 'Jurassic' sediments in the Otway Ra.

Overflow from the lake area into an adjacent river system occurred when the lake level reached a gap in the water-shed between the former Leigh R. and the former Moorabool R. catchment, 3 miles E. from Inverleigh. The flooded valleys of the Leigh R. and Barwon R. were drained through the breach below Inverleigh. Lacustrine deposits and lake terraces emerged as the water level fell. Lunettes, formed above the high-water level, remained in a stranded position (Fig. 2).

As the lake level fell, a divide emerged between the W. and E. parts, and eventually the main water supply was diverted from the W. lake area. The Lough Calvert-L. Murdeduke watershed emerged to the N. of Mt Hesse. The two catchments were connected later by the Mt Hesse Ck. The Lough Calvert-Barwon R. watershed emerged at Warncoort and was subsequently added to by lunettes. The catchments were connected by a drainage channel constructed by the State Rivers

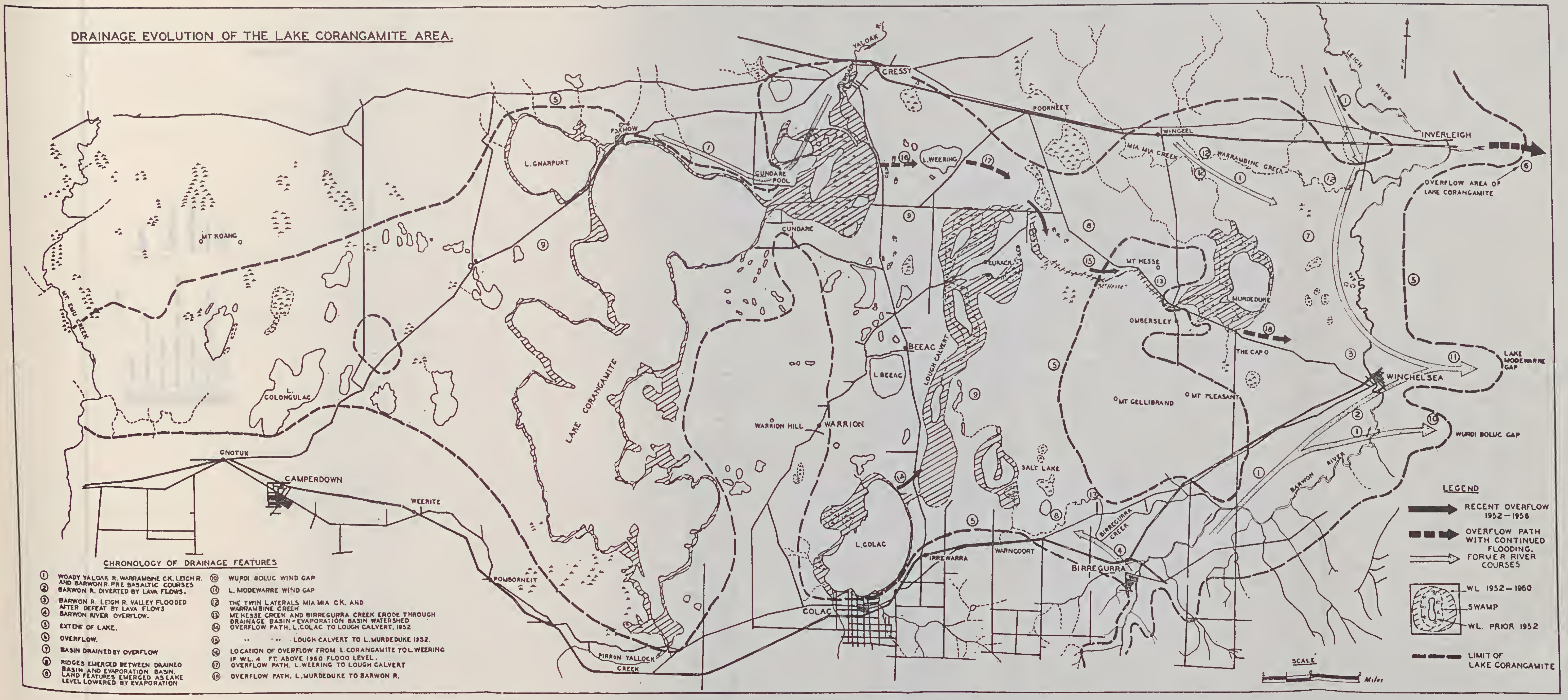

FIG. 1—Plan showing former extent of L. Corangamite.

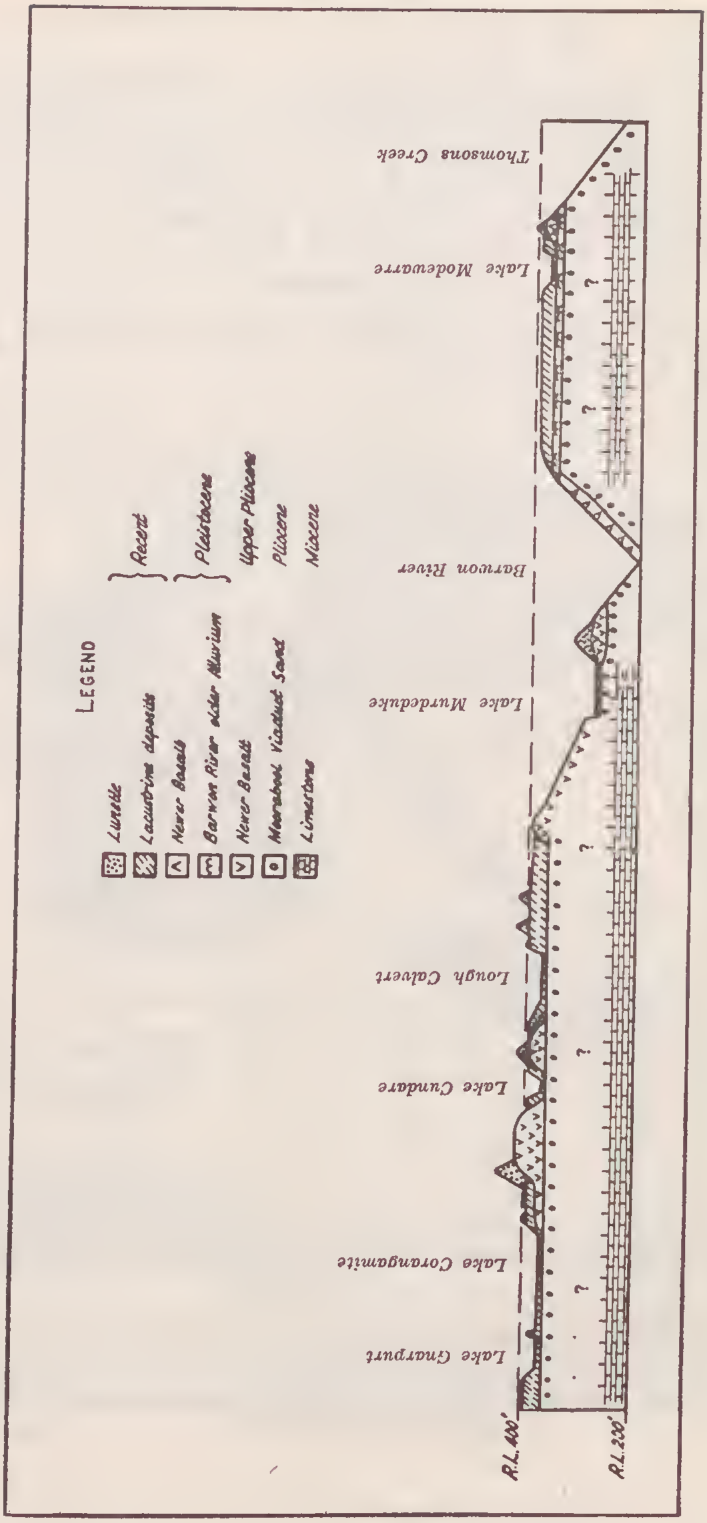

FIG. 2—Section from L. Gnarpurt in the W. to L. Modewarre.

and Water Supply Commission in 1952. The L. Murdeduke-Barwon R. watershed emerged N. and W. of The Cap.

The precipitation of the time was not sufficient to retain the water level in the W. lake area. As the lake level fell, lake terraces and lava flows emerged as land forms. During high water level stillstands, lunettes were built up on the emerged surfaces between the lakes. As the shoreline of the individual lakes receded, multiple lunettes were formed successively from E. to W. in each basin.

Present-day lake fluctuations result in cliff formation, by wave erosion, and lunette formation from wind-eroded swash zone material.

Lunette Formation

The lake level fluctuated, with a falling trend through evaporation. The lacustrine sediments of varying thickness comprised clay, loam, coxiella shells, and sodium chloride crystals as an evaporite.

Successive lines of lunettes were formed on barriers, immediately outside the swash zone, from wind-eroded dry swash material. The typical land form consists of a lunette, deposited on a lava barrier, and a lake terrace apron to the W. The apron contains a smaller lunette above a wave-cut cliff terminating the terraces (Fig. 3). The inner lunette often forms part of the wave-cut cliff section.

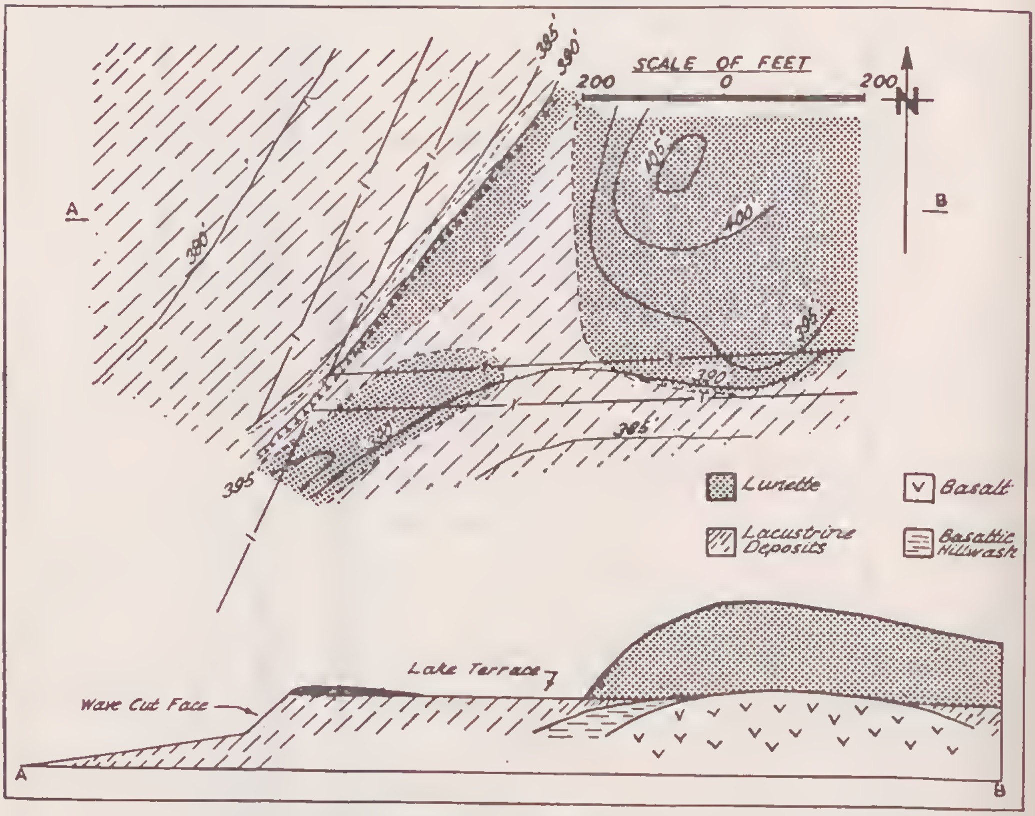

FIG. 3—Typical land form: lunettes, lake terrace, and wave-cut cliff. Parish of Turkeeth, allotment 50.

The lunettes in the lake area vary in composition. In the S., E. of L. Colac, the lunettes are composed of sand. Similarly to the E., in the vicinity of 'Mt Hesse' homestead, the lunettes are of sand, capped by a 9 in. layer of sand cemented with calcium carbonate. From L. Corangamite to Lough Calvert the lunettes are usually composed of loam. Lunettes, 60 ft high, on the NE. shoreline of L. Corangamite, are capped by a consolidated layer of coxiella shells, at R.L. 445 (Fig. 4). A lunette of coxiella shells and loam exists at the N. extremity of L. Corangamite. A number of similar lunettes were formed from swash material during the 1875 high water level, approximately R.L. 388. The high water level of 1960, R.L. 391, destroyed all but the most northerly 1875 lunette (Fig. 5). Coxiella shells are being deposited on the dune at present. The shells are derived from lunette material and the shell lenses exposed in the wave-cut cliff faces.

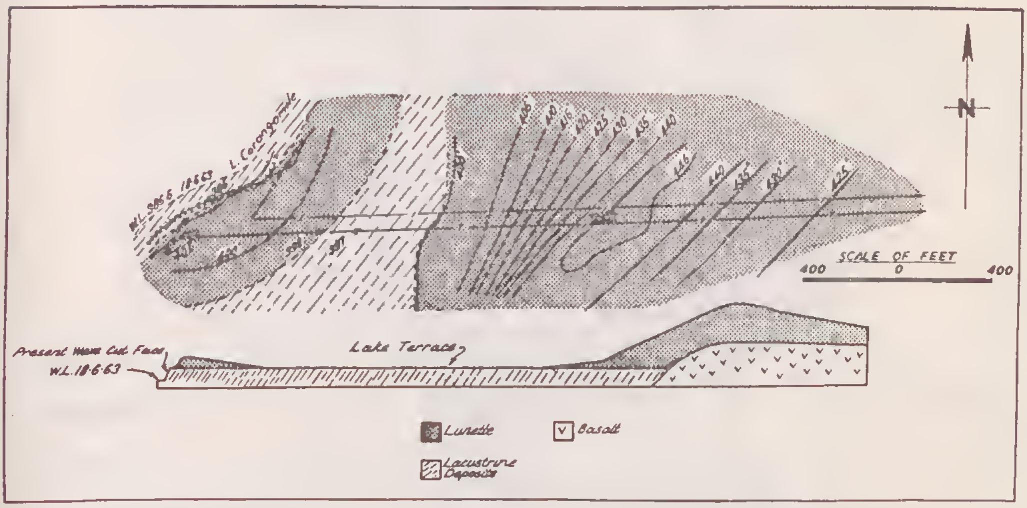

FIG. 4—Lunettes above L. Corangamite N. Parish of Cundare, allotment 74a.

Stephens and Crocker (1946) suggested that lunettes were formed during a period when the lake beds were dry. In the lake area it appears that wind action and high water levels governed the location of a lunette formation. Successive lunette suites were formed contemporaneously with the shifting E. shoreline, migrating to the W., or up wind. To the N. of Lough Calvert successive barriers emerged over a distance of 600 ft (Fig. 6). The E. barrier, the first barrier exposed, contains a lunette 2 ft high. A lunette to the W., the second barrier to emerge, is 12 ft high. The third and last barrier to emerge to the W. and in front of the others has a lunette 7 ft high. The lunettes formed on each barrier as it emerged. As the water level fell, the new lunettes formed in the front W. position starved the formation to the E.

The lunettes existing above the highest water level were formed during the suggested wet period. Hills (1940) considered that lunettes in N. Victoria could have been formed in a relatively wet late Recent epoch. In the lake area lunettes were formed throughout the suggested wet period, from the final stages of vulcanicity to the present.

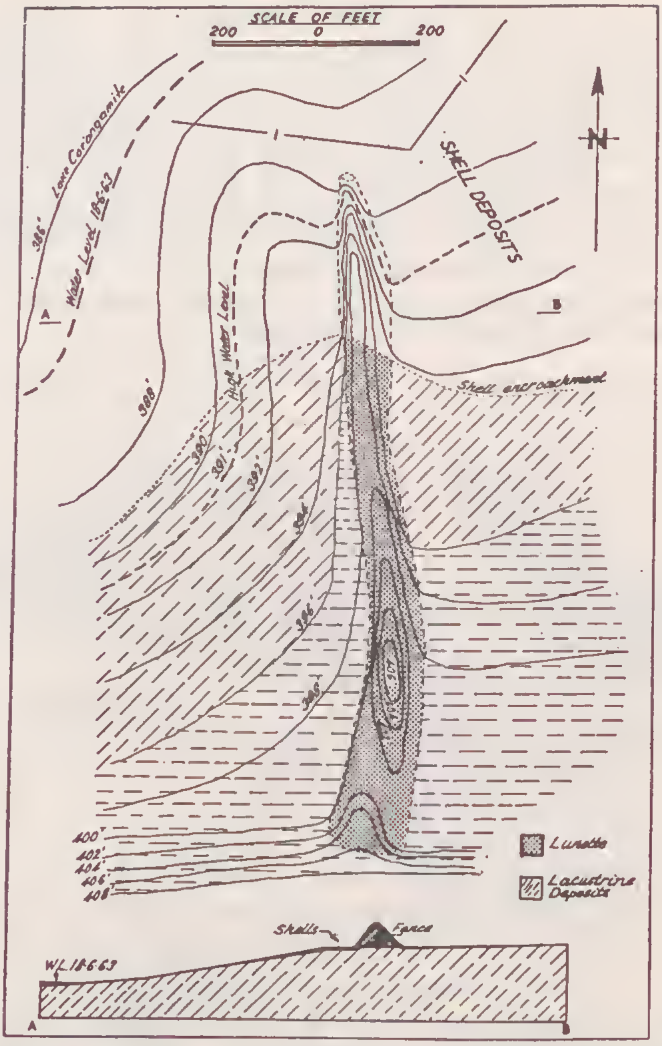

FIG. 5—Coxiella shell dune, formed in 1875. L. Corangamite N. Parish of Cundare, allotment 87b.

The Present Lake Area

(Fig. 7)

The Mt Emu Ck drains the W. flats of the area to the sea. The exact elevation of the area is uncertain. The flats between Mt Emu Ck and L. Corangamite contain scattered lakes and high-level lake terraces. Lunette formations occur above the E. shorelines of numerous lakes to the W. of L. Corangamite.

L. Corangamite receives the Woady Yallock R. in the N. and Pirron Yallock Ck in the S. L. Gnarpurt in the NW. is separated from L. Corangamite by a narrow bar containing a low lunette, rising to R.L. 394. A coxiella shell bed occurs below

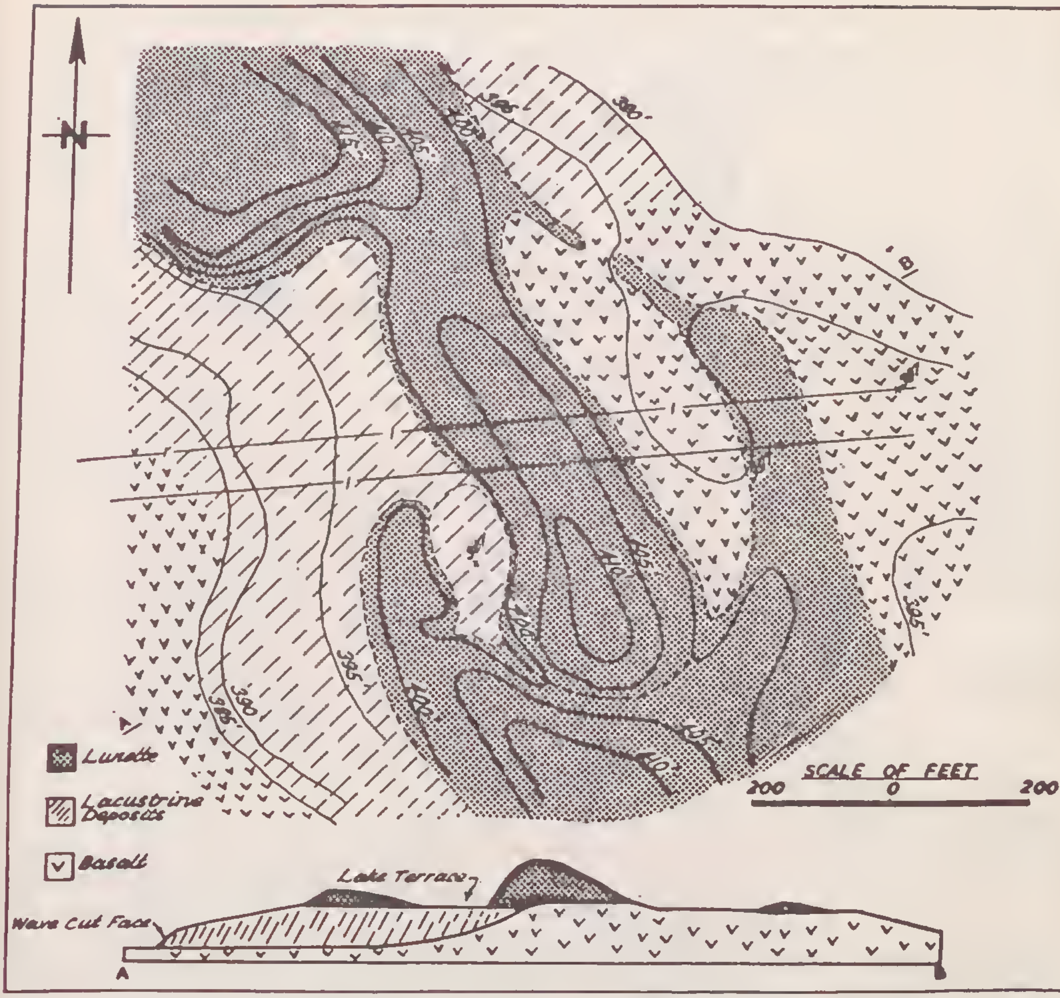

Fig. 6—Multiple lunettes. Parish of Cressy, allotment 66.

the lunette at R.L. 387. The Cundare Pool forms the N. extension of L. Corangamite. A lake deposit to the W. of the L. Corangamite-Cundare Pool channel rises to R.L. 420 and dips gently to the NE. The mode of formation of this deposit is not understood.

There are three lake systems in the E. area ineluding L. Corangamite, eaeh being oriented N.-S. The central lake system ineludes L. Weering in the N., L. Beeae and L. Colae in the S. Lough Calvert in the E. area is conneeted in the N. with smaller depressions around 'Mt Hesse' homestead, farther to the E. Long sinuous lunettes separate the various lakes and lake systems.

Laeustrine deposits cover a flat surfaee of Moorabool Viaduct sand at the N. extremity of L. Gnarpurt to a depth of 6 ft. Coxiella shell beds oeeur 8 ft below natural surface from the Cundare Pool to L. Weering. A tuff bed oeeurs above the W. shoreline of Lough Calvert. An examination of the tuff was made by Dr Speneer-Jones at the Mines Department. He reported that the tuff contained detrital sand.

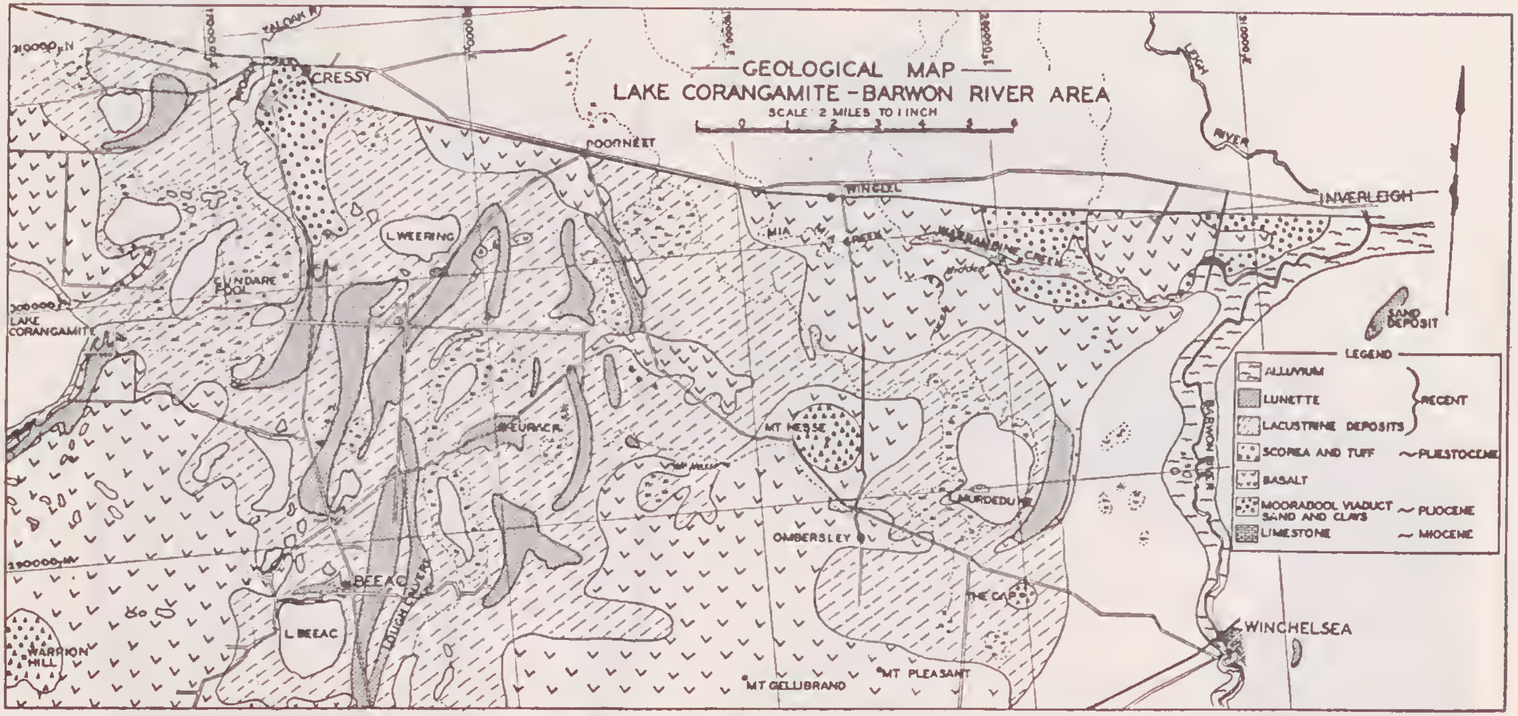

Fig. 7—Geology, L. Corangamite to Barwon R.